

REMARKS

Reconsideration of the above identified patent application is hereby respectfully requested in view of the foregoing amendments and following remarks. Claim 10 has been canceled and claims 1, 11, 14, and 20 have been amended. Claims 1-9 and 11-20 remain in the case.

The correspondence address has again not been properly updated. Having power of attorney in the matter please change the correspondence address to that shown at the end of this response. This request is courteously repeated at the end of the remarks section. If the Examiner requires anything additional from the undersigned to accomplish the change of address, please contact the undersigned by telephone (rather than by mail) at the telephone number appearing at the end of this document to ensure that no correspondence is lost in the mail.

1. Acknowledgment of the amendment filed on 11/28/03 and of its persuasiveness is appreciated. The new grounds of rejection are noted.

2. The drawings were objected under 37 CFR 1.83 (a) as not showing the means of claims 9, 11-13, 16-17, and 19. A replacement formal **FIG. 1** is enclosed in duplicate which shows the elements recited in the claims and in the specification. Please replace the previous **FIG. 1** drawing with the enclosed replacement.

It is believed that those possessing ordinary skill in the art of making connectors to rapidly recharge the batteries of electric vehicles would have had no difficulty whatsoever understanding the recited means (based on the description in the specification) without modification to any of the drawing figures. However, the applicant is pleased to include these means in the replacement drawing consistent with the terms and descriptions contained in the specification and claims. Therefore, no new matter is included in the drawings. Reconsideration of the rejection under 37 CFR 1.83 (a) is respectfully requested.

3-6. Recitation of 35 USC 102 (b) and the rejection of claims 1-8 as being anticipated by Fukushima et al. and the recitation of 35 USC 103 (a) and the rejection of claims 9-10 and 12-20 as being unpatentable over Fukushima et al. and the further rejection thereunder of claim 12 as being

unpatentable over Fukushima et al. in view of O'Dea is noted.

Base claims 1, 14, and 20 have been amended to include the elements of now canceled claim 10 and also portions of the language of claims 12 and 13. Therefore, no new matter is included and no new issues for consideration are raised.

Paraphrasing, the base claims now also include the limitations that the connector must include a method of determining a temperature of the connector and if the temperature exceeds that of a predetermined threshold amount, then the current that is flowing through the conductor is affected.

The Examiner asserts in the Office Action, page 4, last paragraph that the instant application fails to provide any reasons or describe any problem that is solved by the claimed temperature monitoring structures, and therefore absent any such recitation, the decision to measure temperature is but a matter of design choice.

The applicant respectfully disagrees. The following recitations are extracted from the specification.

"Accordingly, there exists today a need for an electric vehicle battery rapid charging connector that has a lower insertion or removal force, is safe, and which provides for additional functionality.

It is an object of the present invention to provide an electric vehicle battery rapid charging connector that has a lower insertion force than similar capacity types of prior art electrical connectors.

Still another object of the invention is to provide an electric vehicle battery rapid charging connector that is adapted to supply a signal to a charging system whereby the charging system can respond to an over-temperature condition by shutting down or otherwise limiting its operation.

Yet another important object of the invention is to provide an electric vehicle battery rapid charging connector that has a smaller sized contact (i.e., socket and pin) than other similar capacity types of electrical connectors.

Still yet another important object of the invention is to provide an electric vehicle battery rapid charging connector that is especially safe to use, and

Still yet one further important object of the invention is to provide an electric vehicle battery rapid charging connector that has a lower insertion force for inserting a plug into a mating receptacle than other types of similar capacity connectors."

The specification then discloses the claimed structures and clearly states how the above important objectives, previously unattainable, are satisfied by the claimed structures.

"Prior art connector design (not shown) requires that the pins and sockets must be large enough to carry the intended current load and to do so indefinitely. This is because in other prior art applications the duty cycle may be expected to vary from zero anywhere up to 100% and therefore, the maximum current may have to be delivered constantly. Therefore, the pins and sockets must be able to handle this load indefinitely and so they are made large enough to do so. Those skilled in prior art connector design routinely design the pins and sockets so that they can indefinitely handle the greatest current that they will normally experience by using larger types of connector pins and sockets. Larger connector mating (i.e., pins and sockets) is disadvantageous because it requires greater

insertion (and withdrawal) force for mating and un-mating to occur. It also results in physically larger connectors.

However, rapid battery charging of electric vehicle 37a batteries does not require nor maintain maximum current flow throughout the entire charging (recharging) cycle. Rather, the rate of charging decreases as the battery or batteries become more fully charged. Accordingly, the pins and sockets that carry the charging load (and ground) of the instant invention 20, 22, 24 may be made smaller than what is required to sustain a continuous maximum load, provided that other safety controls to limit the current flow either over time or upon the occurrence and detection of other abnormal conditions are also provided.

During a normal charging cycle, a very high rate of current flow will initially occur and this rate will taper off over time. The battery temperature and voltage sensing capabilities discussed above can be used by the charging system to detect improper operation (in the electric vehicle 37a) which, if detected, could then result in a cessation of charging current flow through the connector 10.

An increase in the temperature of the connector 10 itself is another condition that can be caused by several

factors, including an excessively high rate of charge that exceeds the current carrying capacity of the connector 10, a protracted rate of a maximally permissible current flow that exceeds the maximum permissible time, or a failure in any of the positive, negative, or ground contact sockets 20, 22,

24. Any of these conditions will result in an increase (i.e., a rise) in the temperature of the connector 10.

A failure, for example, in the contact sockets 20, 22, 24 could be of the form of an increase in the electrical resistance between the socket 20, 22, 24 and its mating pin, such as from dirt or insufficient contact pressure. An increase in electrical resistance would cause an increase in power consumption in the connector 10 to occur, which would then cause a rise in temperature to occur.

If this were to go on long enough undetected the potential for damage is great. The battery or batteries in the electric vehicle 37a may be damaged, or worse yet, they could explode or perhaps the electric vehicle 37a might catch on fire. Similarly, the connector 10 itself, especially if it is formed of a combustible material such as molded rubber, could ignite.

Any of the six smaller signal contact sockets 26, 28, 30, 32, 34, 36 can, if desired, be connected to a thermocouple 49 (i.e., a method or device for sensing or otherwise determining the temperature of the connector 10). The resistance of the thermocouple 49 changes with temperature and so it is used to provide an electrical signal that is proportionate to the temperature of the connector 10 and this signal and is monitored by the charging system.

If a maximum threshold temperature is exceeded, it can be assumed that either a failure has occurred or that some other improper and potentially unsafe condition has arisen.

Accordingly, the charging system would then either lessen or stop attempting to charge the electric vehicle's 37a battery or batteries once the maximum permissible operating temperature of the connector 10 was exceeded.

This provides a method for determining and for monitoring the temperature of the connector 10. This, in turn, provides a fail-safe mechanism whereby smaller contacts may be safely used in high current applications that would otherwise be impossible because current flow through the smaller contacts (i.e., sockets) will be stopped

(or lessened) if any type of a fault condition causes a dangerous temperature rise to occur in the connector 10."

Clearly, the connector, as the "instant" claims now recite includes elements absent from any previous electrical vehicle battery charging connector and these elements provide substantial benefits previously unattainable. To summarize, the claimed structures provide:

-smaller connectors than would otherwise be possible

-a lower insertion force because of the smaller connectors, and

-fail safe operation (certain shutdown) in the event of a problem or failure whereby a higher current flow occurring through a smaller capacity connector (new in the art) cannot result in damage to the connector.

All of these benefits are made possible by monitoring the temperature in the connector and affecting the current flow if a threshold is exceeded, as claimed.

Accordingly, it is believed that there is ample support (i.e. reasons) in the specification that show several problems are solved by the instant claimed structures.

The claimed structures are absent the prior art and would be absent any applied combination thereof.

Accordingly, all rejections are believed to be overcome.

Reconsideration of remaining claims 1-9 and 11-20 is respectfully requested.

Claim 11 has been amended only to correct an error in antecedent basis arising from the canceling of claim 10.

As all remaining claims 1-9 and 11-20 appear to be in condition of allowance, reconsideration thereof is respectfully requested, and a notice of allowance is courteously urged at the earliest time.

The applicant appreciates the opportunity to communicate by telephone with the Examiner if necessary.

Please note: This is a second request to update the correspondence address. Having power of attorney in the matter please direct all correspondence to the

correspondence address and telephone as shown below prior to
the mailing of any further correspondence. Thank you.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Risto A. Rinne, Jr." followed by the date "6/17/04".

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